

1

CELLULAR PHONE WITH BUILT IN OPTICAL PROJECTOR FOR DISPLAY OF DATA

FIELD OF THE INVENTION

The present invention generally relates to the field of data communications. More specifically, the present invention relates to a cellular phone for receiving electronic data through a wireless network, for example, the Internet, and displaying the data by way of a built in optical projector which projects the received data onto an external surface.

BACKGROUND OF THE INVENTION

Cellular phones allow for mobile voice communication when on the go, from practically anywhere. As cellular phones have become smaller and lighter, they have become even more convenient to carry on one's person. At the same time, with the growing popularity of the Internet, cellular phones are being used as receivers of not only voice data, but of various forms of visual data, such as E-mail, various forms of processed documents, graphics, pictures and video. While the compactness of a cellular phone is advantageous for portability with regard to ordinary voice communication, this diminution in size, by its very nature, creates a built in disadvantage with respect to the display of visual data, viz., the display is too small to practically present most documents and visual data in their original full page format so as to be viewable and readably by a user. One solution to this problem is to arbitrarily reformat each page into several smaller pages, so as to be contained in the viewing frame of the cellular phone's built-in small screen. The user is then forced to scroll through and wade through many small pages to read what might have originally been sent as one page. Additionally, because of the inherent small screen size, the individual characters of displayed documents are hard to read because they themselves, out of necessity, are diminished in size. Further, given the limited viewing size of the display, graphical images are oftentimes not displayed properly.

One solution to the above-mentioned problem is presented in U.S. Pat. No. 5,970,418, the contents of which are incorporated herein by reference, which discloses a personal communicator with an integrated virtual image display. Specifically, what is disclosed is a wireless handset phone which utilizes optics to create a virtual image which is displayed on a viewing surface attached to the phone itself, for example, by way of pivoting support arms.

These shortcomings and inconveniences have discouraged many individuals from using Internet ready cell phones to their full advantage.

A partial solution to some of these problems has been attempted through the enlargement of displays on certain models of cellular phones. However, since there is a direct inverse relationship between the size of an incorporated display in a handheld wireless device and the size and weight of such a device, this approach is less than salutary. The increased size of the built-in display defeats the portability and compactness of the portable communication device.

SUMMARY OF THE INVENTION

The present invention addresses the above-mentioned deficiencies in the prior art. The present invention provides a cellular phone, which is still compact in size and weight,

2

but which also includes a mechanism for displaying received wireless data in its original page format as sent from the original source, thus allowing for the viewing of each original page as a whole page and not as a series of partial pages. The present invention also provides for the display of received wireless visual data with characters in their true original size, thus allowing for ease of reading and use. The mechanism for displaying data may also be used to display data which is to be transmitted by way of the cellular phone. Additionally, the present invention allows for the display size to be adjustable and variable, including the enlargement of the original data received, depending on the particular circumstance and application. This allows for the viewing of video or picture information in a comfortable fashion.

In accordance with the present invention, a cellular phone is provided with an internal optical projector incorporated into the body of the phone so that an original page of visual data can be projected onto a larger surface external to the cellular phone. The external surface is larger than the surface area of the cellular phone's own electronic display, and sufficiently large to maintain the original page format and character size. This is accomplished by providing the circuitry inside the cellular phone with the ability to display the received wireless data representing the visual image on the built-in display of the cellular phone using conventional display device drivers, as well as on an external surface utilizing an internal optical projector which then projects the original image onto the external directed surface. An auto focus capability or manual focus dial is provided to allow for sharp imaging on the external surface.

Additionally, a computer mouse or other manipulation device or user input device may be provided on the surface of the cellular phone so that as the projected image is viewed it can be controlled through visual icons or edited as on a regular electronic screen.

One of the advantages of the present invention is that before sending an E-mail or any document or data file from the cellular phone, a user can view the image in its complete page format and in a convenient and accessible size.

While the description of the present invention is presented by way of an example to a cellular phone, it should be understood that the principles of the present invention are equally applicable to other small, compact, mobile communication devices, such as beepers, pagers, personal digital assistants and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a pictorial diagram of a cellular phone incorporating an optical projector display system in accordance with the present invention;

FIG. 2 is a block diagram of the internal components of the cellular phone in accordance with the present invention; and

FIG. 3 is a block diagram of the optical projector display system in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, therein is illustrated a cellular phone 20 in accordance with the present invention. The phone 20 includes a display 14, as is well known in the art. The phone 20 also includes an optical projector 16 for projecting images onto an external display surface 17, such as a desk, wall, sheet of paper or the like. The phone 20 further includes an optical projector ON/OFF switch 12 for